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The Opportunities and Threats Resulting from Robotic Process Automation in Public Service Development

Abstract

Objectives: This study aims to identify the opportunities and threats of automation and robotisation process automation in the development of public services.

Research Design & Methods: In this study, the method of deduction was used as well as auxiliary methods and techniques such as logical analysis, analysis and study of literature, and classification and scientific description. The reasoning process was based on knowledge of management sciences and the existing findings with regard to digital transformation, in particular the robotic process automation of the public sector and services.

Findings: The study revealed opportunities and threats related to the automation and robotisation of public services concerning three entities/groups: citizens, administration employees, and public organisations.

Implications: The issues presented in the article might constitute the basis for practitioners, mainly public authorities and all other persons responsible for creating and implementing automated and robotic public services. Applications can be of particular interest to local government officials and management staff of various public institutions. Therefore, the robotisation and automation of services will gain in importance in the coming years, and many entities will be involved in their introduction and operation. This paper can also be useful for the economic and non-governmental sectors, whose recipients will be more aware of the opportunities and threats of service automation and robotisation.

Contribution / Value Added: As a result of the analysis, the synthesis of the theoretical findings on the processes of automation and the robotisation of public services as well as certain consequences of these processes for further development of these public services were identified. They were then classified as opportunities or threats to the further automation and robotisation of public services, which may serve as a basis for the establishment of subsequent empirical studies.

Article classification: theoretical/conceptual paper

Keywords: public sector, e-services, digital transformation, robotic process automation

JEL classification: M0, O3, H4

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Introduction

While studying the scientific literature on digital technologies and digital transformation in contemporary organisations and management, including the public sector and its services, one can see that despite the growing interest in this issue, there is still a shortage of research and elaborate theorising in this area (Sobczak, 2013; Hess, Matt, Benlian, & Wiesböck, 2016; Adamczewski, 2017; Andersson & Mattsson, 2018; Filgueiras, Flávio, & Palotti, 2019; Larsson & Teigland, 2020). According to Hess et al. (2016), integrating and exploiting new digital technologies is one of the biggest contemporary challenges, and no sector or organisation is immune to the effects of digital transformation (p. 123).

The evolution of ICT has led to the spread of the next generation of ICT platforms, the so-called SMAC platforms (Social, Mobile, Analytics, Cloud). They create a specific ecosystem of IT solutions, allowing organisations to develop their activities with less financial expenditure and a maximum range of impact, thus creating new business models based on information generated by the economic environment (Adamczewski, 2017, p. 9). Andersson and Mattsson (2018) draw attention to the importance of the development and implementation of new business models supporting public service innovation led by digital transformation. According to the authors, digital transformation stimulates and enables public service innovation as a new way to create value. Innovation in the public context should be evaluated with reference to aspects of "common wellbeing" and focusing on the beneficiaries (Andersson & Mattsson, 2018, pp. 218–219).

Jarbandhan (2017) writes about principles for public sector management in the Fourth Industrial Revolution, which goes beyond the usual automation known from the Third Industrial Revolution towards cyber-physical systems (e.g. driverless cars, smart robotics, materials that are lighter and tougher, or a manufacturing process built around 3D). Houy et al. (2019) consider automation as an important aspect in the context of digitising and modernising the public sector and its work processes. They describe the term 'automation' as the execution of a procedure by a technical artefact without the need of human activity or intervention. Automated systems in the public sector context can support people in working more efficiently and more effectively through performing work processes and solving problems (Houy, Hamberg, & Fettke, 2019, p. 62). However, some negative consequences of robotic process automation are also identified. As Gingrich (2019) notes, robots can replace old jobs faster than new jobs are created. Thus, those who benefit from automation (e.g. owners of capital, highly-skilled workers) and those who lose (e.g. displaced workers) are expressing different preferences over the fundamental features and the future shape of liberal democracy (Gingrich, 2019, p. 1).

Based on these findings, the conclusion is that we are faced with new challenges related to the development of the public sector and the need to rethink the direction of its innovation. In terms of the modernisation and development of public services, numerous positive modifications have already taken place, and several improvements have been introduced. However, Poland is currently only at the first stage in the implementation of modern, automated, and robotised public services. While public entities already provide digital services that do not require direct contact between the provider and the recipient, they are still equated with a form, application, or document that can be sent through the Internet. Based on these findings, the prospects for the development of modern public services that meet the needs of their beneficiaries and build a greater common good should be examined. Therefore, the study aims to identify the opportunities and threats of automation and robotisation for the development of public services.

After this introduction, the paper proceeds as follows. Section Two contains a review of previous work undertaken in the area of digital transformation and robot process automation regarding public services development. Then, the research method is

presented and explained in Section Three. Section Four contains the research results and achievements, where the summary of opportunities and threats related to the automation and robotisation of public services is presented. The results are discussed in Section Five in the context of the wider changes and innovation of the public sector and related opportunities for further research. Section Six contains some concluding thoughts and suggestions for future research.

Literature review

The bigger part of the world has been dominated by information technology, which applies to almost every field of human activity. While using modern IT solutions on a daily basis, the public expects that similar standards and solutions will be offered to them by public administration. It is even widely believed that public institutions should not merely take into account these expectations, but even exceed them (Dąbrowski, 2012). Well-designed and implemented electronic public services, properly tailored to the needs of citizens, are extremely important, as they guarantee the efficient and effective organisation of the state in the provision of public goods, which constitutes the basis of a modern information society (Kachniarz, 2012, p. 18). The use of modern electronic solutions in public administration provides an exchange of information while providing favourable conditions for cooperation between citizens, businesses, and various organisations with public entities, based on new communication models. Completely new relations and new conditions for cooperation are being developed between offices and stakeholders. Offices more and more often take the form of an e-office (e-administration) and the services provided so far in the system of direct contacts are becoming e-services (Pieczarka, 2017, pp. 113–114).

The dynamic development of the Internet has contributed to the emergence of modern categories of the so-called e-services. They are created, *inter alia*, as a model of traditional services, where the information carriers between the provider and the recipient use electronic channels (e.g. e-PUAP platforms). At the same time, e-services are increasingly catering to the needs of new customers (citizens), often unconscious, but posing other conditions to meet the needs of the new technological possibilities (e.g. the PIT e-service). It can be observed on an increasing scale that electronic services are either complementary to traditional services or even substitute them. Public administration also implements many IT projects aimed primarily at improving the work of offices and customer service. The use of modern IT solutions contributes to the simplification of procedures and quick customer service, as well as the improvement of the organisation of the work of offices and better coordination of processes. It seems necessary to determine how the automation and robotisation processes will affect the development of public services.

Dąbrowska et al. (2009) defined e-services as

> [a] new formula for providing a service and thus satisfying the needs using the Internet, from the moment the company contacts the client (individual or stationary) to present the offer, through ordering the service, its provision, and contact after the service. The virtual form of service provision allows for greater standardisation of services and may refer to full or fragmentary e-customer service as part of the service provision process appropriate for a given type of service. (p. 41)

In the literature, one can find many terms with supposedly the same meaning, e.g. electronic services, electronically-supplied services, e-services, on-line services, digital services, virtual services, or information society services. The vocabulary is used interchangeably to a greater or greater extent. There is a lot of chaos in defining the e-service offered by the public sector. It thus seems necessary to precisely define the public e-service and determine the factors influencing its development.

In this study, it was assumed that e-public services are understood as actions undertaken by public entities that rely on enabling citizens to implement

a particular obligation or powers, introduced using electronic means of communication at a distance without the simultaneous presence of the parties. The development and improvement(s) of public services are inherently related to automation and robotisation. The concepts of automation and robotisation are often used interchangeably, too. Although the difference is insignificant, it is worth emphasising. According to some researchers (Sobczak, 2019), automation is a more general concept than robotisation and as such means introducing the so-called automatic devices (Grzeszak et.al., 2019, p. 8). Robotisation is a form or type of automation. Other researchers (Moreno & Jimenez, 2018, p. 224) believe that robotisation is a more comprehensive concept and includes computational processes, digitisation, automation, artificial intelligence, big data, and information and communication technologies (ICT). The common goal of automation and robotisation is to replace human labour. In the case of automation, human work is replaced by an IT system, while in robotisation replacing a human at work translates into a robot in the physical sense, or a type of software (Sobczak, 2019).

The literature distinguishes two types of robots: industrial and service. The difference between industrial and service robots concerns the area of their application and proximity to end-users (Prestes, Carbonera, Fiorini, Jorge, Abel, & Madhavan, 2014). Until recently, robotics was dominated by industrial robots. The Robotics Industries Association (RIA) defines an industrial robot as a reprogrammable, multi-functional manipulator designed to move materials, parts, or special devices through programmed movements to perform a variety of tasks (Keramas, 1999). Another approach is proposed by the International Organization for Standardization (ISO), which defines robot as "a machine with several degrees of freedom, often having the appearance of one or more wrist-ending arms capable of holding a tool, workpiece or control device" (Sirinterlikci, Zane, & Sirinterlikci, 2011, p. 158).

The number of robots used for professional and personal service applications is growing rapidly. In 2006, service robots accounted for 78.84% of the total robotic population, and industrial robots for 21.16% (Sirinterlikci, Zane, & Sirinterlikci, 2011, p. 158). Professional service applications are used in medicine, laboratories, forestry, mining, agriculture, rescue, defence, and security. Personal service applications are mainly used in education, housekeeping, and entertainment. Service robots are technical devices that perform tasks useful for the well-being of people in a partially or fully autonomous manner (International Federation of Robotics, 2015). The potential of automation and robotisation can be seen in the public sector, especially in medicine, geriatrics, care for people with disabilities or child therapy (surgical robots – classic surgical robots, surgical microrobots; diagnostic robots – classic diagnostic robots, microrobots, and diagnostic nanobots; rehabilitation robots – stationary, exoskeletons, telerehabilitation robots; care support robots – service robots in institutional care and auxiliary robots in-home care; others – therapeutic robots for adults and children, robots supporting learning or work, robotic rooms, integrated environments) (Mikołajewska & Mikołajewski, 2013, p. 109).

The authorities of some European countries emphasise the positive aspects of using robots in public services. In 2017, the British government published the report titled *Growing the Artificial Intelligence Industry in the UK* (Open Access Government, 2017). This report highlights that the use of artificial intelligence (AI) can bring the UK economic and social benefits. According to Paul Tomlinson, Director General of IEG4, there is still a tendency to think about AI primarily as a means of increasing productivity and saving money, but much less attention is paid to the potential of improving the citizen experience. The public sector can gain significant benefits owing to automation and robotisation (Open Access Government, 2017).

Exemplifying the use of robotics in public services is the Robotic Processing Automation (RPA) – the robotic automation of processes. They are software robots called 'bots' and designed to automate rule-based tasks by mimicking user interactions. Thus, a software robot is used to handle repetitive, multi-series activities. In this case, the robot is a computer-coded software, a programme that replaces people performing rule-based tasks, and a cross-functional and cross-application macro (computer algorithm), but not a walking, talking autobot, a physically existing machine, or a software that recognises voices and responses (Teuben & Vrielink, 2017).

The pace of changes in public services is limited, *inter alia*, by the presence of complex, costly, and often outdated IT systems. The RPA allows one to replace traditional processes with automated ones, thus making quick and effective improvements without a comprehensive system review (Teuben & Vrielink, 2017). The above examples clearly show the coexistence of robots and humans, which is also true in public services. This implies several positive and negative social changes that are worth taking a closer look at (Sasak, 2020).

Methods

The choice of the research method was driven by the reference to two aspects of the issues raised: 1) the adequacy of the methods to the research objective and research problem, and 2) placing the issues in management considered as practical sciences, and precisely at the interface between service management, public management, and innovation management (Cyfert, Dyduch, Latusek-Jurczak, Niemczyk, & Sopińska, 2014; Lisiński, 2018). Given the identified lack of theoretical knowledge on the processes of digital transformation and robotic process automation of public services within these subdisciplines, theoretical research was undertaken, the results of which could be used in the development of future empirical research in this field.

Therefore, although the research was located within the framework of the practical management sciences, the method of deduction was used to solve the above-mentioned scientific problem, and its auxiliary methods and techniques were used, namely logical analysis, analysis and study of literature, classification, and scientific description. The research is based on the achievements of management sciences limited by the scope of the adopted goal and the research problem, as well as the existing knowledge about the robotic process automation of the public sector and services.

The basis of the deductive reasoning was a literature review carried out for this purpose, including management sciences knowledge and the existing findings on digital transformation (in particular on the robotic process automation of the public sector and services) related to the attempt to capture the specificity of development processes in the public sector. The aim of such a literature review was not so much an accurate description of the state of knowledge (as in the case of a systematic literature review) as to build a knowledge base sufficient to deduce conclusions about the opportunities and threats of automation and robotisation processes in the development of public services.

This type of literature review is based on a completely different, i.e. non-quantitative, logic/sequence of source selection and analysis. The process of literature review is path-leading, interactive, evolutionary, and based on coherence logic. Conclusions from a given cycle of reasoning become the basis for further search in the literature. This iterative process is interrupted when the results are relatively satisfactory; in fact, this process never ends (it is of an evolutionary nature, like a process of scientific cognition itself, which is to some extent a reflection of the evolutionary processes taking place in the studied social reality). This results directly from the nature of science and social reality, where we are looking not so much for a simple inference of conclusions from the premises based on formal logic, but for a relation of coherence between the premises justified in the studied literature

and the conclusions constituting new knowledge (which is not a simple statement or juxtaposition of facts previously known in the studied literature). In addition, there is an even broader context related to the ontological and epistemological status of premises and conclusions in science in general, and in social sciences in particular (e.g. verificationism vs. falsificationism), as well as its consequences for the cognitive and inquiry processes (Czakon, 2011; Dewey, 1991; Dubois & Gadde, 2002; Flach, 1996; Grobler, 2006; Lisiński, 2013, 2018; Shepherd & Sutcliffe, 2011; Schön, 1992), which, however, goes far beyond the scope of this paper. Such a reasoning process itself is difficult to reproduce precisely in the form of a linear procedure (like the one proposed by the systematic review), because it is simply not linear in the case of social sciences, which is entangled in a series of ambiguous relationships.

Research results

Digital transformation is systematically changing the way in which different areas of society and economy function. As mentioned above, it also affects the public administration sector and the services it offers. Regarding the said literature review, three areas of digital transformation that shape public services can be identified: 1) the experience of stakeholders (understanding the needs of citizens, introducing multiple channels of communication with the clients, and implementing elements of self-service); 2) operational processes (internal processes of the organisation and work environment as well as mechanisms for monitoring the performance of individual tasks); and 3) business models (adjusting public services to the needs of citizens) (Westerman, Calméjane, Bonnet, Ferraris, & McAfee, 2011).

Based on a report prepared by the Roland Berger consulting company on behalf of the German Bundesverband der Deutschen Industrie e.V. – BDI, four key elements of digital transformation have been identified: 1) digital data – capturing, processing, and analysing digital data allows for better predictions and decisions to be made; 2) automation – combining traditional technologies with artificial intelligence is giving rise to systems that work autonomously and organise themselves, which reduces error rates, adds speed, and cuts operating costs; 3) connectivity – interconnecting the entire value chain via mobile or fixed-line high-bandwidth telecom networks synchronises supply chains and shortens both production lead times and innovation cycles; 4) digital customer access – mobile Internet gives new intermediaries direct access to customers with full transparency and new kinds of services (Berger, 2015, pp. 17–19). Automation processes that can be combined with the use of artificial intelligence in the processes of providing public services are particularly interesting for the further development of the public sector. Smart automation is not only about replacing people with machines, but also about increasing operational efficiency through the use of interactions between people and technology (Gajewski, Paprocki, & Pieriegud, 2016, p. 20).

According to Sobczak, the issue of digital transformation plays a particularly important role in the development processes of public organisations. Both citizens and businesses expect these organisations to provide public services through all possible channels at a similar level of quality as the private sector does (Sobczak, 2013, p. 280).

Poland is at the beginning of the process of automation and robotisation of public services. The next stage of development will take place when the proper public e-services will be provided at the middle-office level. Submitting an appropriate application form, regardless of whether it is a traditional or electronic form, should have the same consequences when it comes to digitally-transformed public services. The recipients should not be involved in the technical side of service delivery processes, but, rather, receive the public service results with specified qualities (Szczudlińska-Kanoś, 2020).

While studying the literature, one can find that the next stage of digital transformation of public

services is expected to be at the level of a specific set of organisational units connected with each other and functioning in the form of a network (Homburg & Bekkers, 2002; Möller & Svahn, 2003; Sobczak, 2013).

The last stage in the development of public e-services seems to be the moment when the services will be implemented at the back-office level and combined into the so-called "packages". This will require service providers not only to engage in their duties and competences, as is the case with the middle-office stage, but also to cooperate with other public, private, or third-sector entities. It would be advisable that one report in the case of a specific random event serve to settle many matters (Szczudlińska-Kanoś, 2020).

Based on the analysis of the literature, it was indicated that the opportunities and threats related to the automation and robotisation of public services concern three entities/groups: citizens, administration employees, and public organisations. As a result of the analysis of the theoretical findings

Table. 1. Opportunities and threats resulting from robotic process automation of public services

Opportunities	Threats
Better matching of services to the needs of citizens/recipients	Poor access to information technologies for some social groups (information exclusion)
Modernisation of services and the processes of their provision	Dependence on information systems (nothing can be done if there are technical problems)
Lower service costs	Some people employed in public services might lose their jobs
Accelerating the development of digital competences in society	Dehumanisation of services
Greater transparency in spending money and achieving goals	Negative effects of standardisation (less flexibility and no individual approach to clients/stakeholders)
Increasing operational efficiency as a result of interactions between people	No help from officials (instead – bots, helplines, etc.)
Relieving public sector employees (robots will take over some of their repetitive activities) as well as better use of the creative potential of employees and their competences	Difficult access to public information for people who are less concerned with information technologies
Relieving service users; robots will take over some of their repetitive activities	A sense of alienation amongst both officials and recipients of public services (the system as something external, over which we have no influence and to which we must adapt)
Transparent rules and better control of service delivery processes	Lack of direct contact
Easier access to public information	Difficulties in dealing with atypical situations, in which human intuition and intelligence plays an essential role, which, in turn, might affect the quality of data processed by robots
Possibility to devote more time and attention to those citizens who need help (instead of fast standard service)	Poor alignment of all parts of the system in a rapid process of change, e.g. between officials and citizens
Trigger and acceleration of further changes in the public sector	Low quality of received feedback (only standard and general information)
Easier to get feedback from service users	No exact explanation of the product
Availability of services 7 days a week and 24 hours a day from anywhere with access to the Internet	Extended feedback process in case of problems
Faster data collection and analysis	

Source: Own elaboration.

on the processes of automation and robotisation of public services, certain consequences of these processes for the further development of these public services were identified. They were then classified as opportunities of – or threats to – further automation and robotisation of public services (Table 1).

In the future, only those digital services will be useful and appreciated which will meet the expectations of more and more demanding citizens. On the one hand, it is necessary to automate and robotise the public services, while on the other hand it is essential to simplify them as much as possible, especially in times of a demographic crisis, when increasingly older communities should benefit from them. Therefore, when creating modern public services, it is inevitable to use methods and techniques of process management. An accurate process analysis of the service allows us to verify and evaluate subsequent component activities, and to improve them.

Discussion and concluding remarks

The study investigates the possible ramification of the implementation of technological solutions, i.e. automation and robotisation, in the public sector. In the face of the ongoing technological changes, the question arises whether this transformation will be beneficial, and for whom. Two extreme visions emerge in this context: optimistic and pessimistic. In the optimistic one, the emphasis is put on development opportunities, saving time and energy, unleashing creativity. The pessimistic one points to depriving people of work, condemning many social groups to idleness, marginalisation, and, as a consequence, social unrest (Infuture Hatalska Foresight Institute, 2019). This gives a black-or-white picture of what awaits us in the future with the changes that follow.

The results of the research presented in this study emphasise both positive and negative aspects of automation and robotisation of public services to citizens, administration employees, and organisations. Thus, as a result of the analysis, a third rationalist vision emerged, emphasising both the benefits and threats of potential changes.

There is no doubt that changes in the area of public services will take place, and so the sense, purpose, form, and definition of public services will transform. Larsson and Teigland (2020) pose quite a fundamental question with regard to digital transformation, namely: "how and why?" By examining opportunities and threats, we try to answer the question about why the public sector cannot remain indifferent to the ongoing digital transformation and the accompanying robotic process automation. On the other hand, the indication of opportunities and threats is the basis for selecting future directions of empirical research. They are interdisciplinary, because they concern research related to the evolution of implemented technological solutions in public services, new management styles in the context of these changes, the adaptation of Polish society and individual social groups to new opportunities, as well as ethics and safety, including responsibility for the work of public-sector robots.

Poland is not one of the most digitised countries in Europe, especially in the public sector; therefore, the prospect of introducing advanced digital technologies might be causing anxiety among the rulers, employees, and citizens (Kawecki, 2017). This is evidenced by the fact that already nearly one-third of the world's leading companies believe that their revenues will be threatened in the coming years by digital disruptions, i.e. the phenomenon of a sudden appearance of new technologies and business models affecting the value of the products and services currently provided by these organisations (Adamczewski, 2017, p. 10). These unpredictable, complex, and ambiguous phenomena are often described as VUCA, the acronym for the four dominant properties: **v**olatility – related to a relatively unstable change; **u**ncertainty – a lack of knowledge as to whether an event will have meaningful ramifications; **c**omplexity – related to an overwhelming situation characterised by many interconnected parts; and **a**mbiguity – a lack of knowledge as to the basic rules

of the game (Bennett & Lemoine, 2014, pp. 312–316; Adamczewski, 2017, pp. 10–11). This acronym has recently found its way into the business lexicon and the four properties are seen both as challenges and opportunities (Bennett & Lemoine, 2014). VUCA genuinely describes the world of digital transformation and is a significant source of the opportunities of – and threats to – the robotic process automation of public services identified in this study.

The aim of the research, which was the description and explanation of the opportunities and threats connected with the automation and robotisation of public services, allows for the elimination of one of the main factors hindering these processes, namely awareness related to the fear of using this type of innovative solutions. However, this research study has its limitations, which is why this question needs to be justified and deepened in further context-based empirical research.

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